

## Abstract

Huge amounts of water are required for covering the expansion in land reclamation and intensive fish culture activities. To find a new sources of water, ground (well) water is considered as one of the most important sources, being used in many countries specially that located in arid regions. Moreover, recirculating systems are becoming increasingly important for holding and storage of water but also for the commercial culture of many fish species.

This study aimed to investigate the possibility of reusing the aquaculture effluent in the production of *O. niloticus*. As well as, how to maximize the productivity of tilapia that cultured under commercial practices of different intensification levels (40, 60 & 80 fish/ m<sup>3</sup>).

Three groups of concrete pond: **Group I:** used pure well (ground) water. **Group II:** used recirculated ground water. **Group III:** used mixture of pure well and recirculated ground water. All ponds were of the same area (100 m<sup>3</sup> / ponds), at ones of the Arab Fisheries Company (AFC) fish farm, affiliate of the Arab league, Saudi Arabia.

**Physico-chemical characteristics of water:** Temperature, (pH), ammonia, nitrite, Transparency, total hardness, salinity and dissolved oxygen in both of drainage and irrigation water during all seasons were significantly differed. **Heavy metal in water:** Heavy metal (Cobalt, Manganese, Iron, Zinc, Copper and Lead) concentrations were significantly differences at groups of mixed water and recirculated water.

Meanwhile, both of copper, cobalt, iron and lead were not significantly in differences at group well water.

**Part one:** Growth performance of *O. niloticus* during four production seasons: Total weight gain per fish (TWG/fish), TWG/pond and TWG/day): were decreased significantly ( $p < 0.05$ ) with each increase in stocking density under the three varieties of water. Feed conversion ratio (FCR), for the tested fishes improved with each decrease in the stocking density. Survival rate, stocking density and water sources as well as rearing seasons positively affect on the survival rate of reared fishes. Total yield/  $m^3$ , the best yield was for well water than other two groups (mixed and recirculated water). While, the best fish grade at harvesting was obtained at stocking density of 40 fish/ $m^3$ . Length weight relationship, the exponent values that reflect the condition of reared fishes was slightly decreased with each increase in stocking density. Gonadosomatic index (GSI), directly influenced with stocking density and rearing seasons.

**Part two:** Stocking size experiment: Experimental period, rearing periods was increased with decreasing of the initial stocking size of *O. niloticus*. FCR, a strong inversely relationship between feed conversion ratio and initial stocking size. Survival rate, both of water source and stocking size affects directly on survival ratio of reared fishes. **Fish analysis:** Heavy metal in fish, the concentrations of copper, zinc, manganese and lead in fish muscle and liver tissue were lower than the legal levels for fishes reared in the three types of water during four seasons. While, iron in well and mixed were under the allowable level, but in recirculated it was closest to the save level.

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